



$$I^G(J^{PC}) = 1^-(0^-+)$$

We have omitted some results that have been superseded by later experiments. The omitted results may be found in our 1988 edition Physics Letters **B204** 1 (1988).

π^0 MASS

The value is calculated from m_{π^\pm} and $(m_{\pi^\pm} - m_{\pi^0})$. See also the notes under the π^\pm Mass Listings.

VALUE (MeV)	DOCUMENT ID
134.9766 ± 0.0006 OUR FIT	Error includes scale factor of 1.1.

$m_{\pi^\pm} - m_{\pi^0}$

Measurements with an error > 0.01 MeV have been omitted.

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
4.5936 ± 0.0005 OUR FIT			
4.5936 ± 0.0005 OUR AVERAGE			
4.59364 ± 0.00048	CRAWFORD 91	CNTR	$\pi^- p \rightarrow \pi^0 n, n$ TOF
4.5930 ± 0.0013	CRAWFORD 86	CNTR	$\pi^- p \rightarrow \pi^0 n, n$ TOF
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4.59366 ± 0.00048	CRAWFORD 88B	CNTR	See CRAWFORD 91
4.6034 ± 0.0052	VASILEVSKY 66	CNTR	
4.6056 ± 0.0055	CZIRR 63	CNTR	

π^0 MEAN LIFE

Most experiments measure the π^0 width which we convert to a lifetime. ATHERTON 85 is the only direct measurement of the π^0 lifetime. Our average based only on indirect measurement yields $(8.30 \pm 0.19) \times 10^{-17}$ s. The two Primakoff measurements from 1970 have been excluded from our average because they suffered model-related systematics unknown at the time. More information on the π^0 lifetime can be found in BERNSTEIN 11.

VALUE (10^{-17} s)	EVTS	DOCUMENT ID	TECN	COMMENT
8.52 ± 0.18 OUR AVERAGE				Error includes scale factor of 1.2.
8.32 ± 0.15 ± 0.18		¹ LARIN 11	PRMX	Primakoff effect
8.5 ± 1.1		² BYCHKOV 09	PIBE	$\pi^+ \rightarrow e^+ \nu \gamma$ at rest
8.4 ± 0.5 ± 0.5	1182	³ WILLIAMS 88	CBAL	$e^+ e^- \rightarrow e^+ e^- \pi^0$
8.97 ± 0.22 ± 0.17		ATHERTON 85	CNTR	Direct measurement
8.2 ± 0.4		⁴ BROWMAN 74	CNTR	Primakoff effect
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.6 ± 0.6		BELLETTINI 70	CNTR	Primakoff effect
9 ± 0.68		KRYSHKIN 70	CNTR	Primakoff effect
7.3 ± 1.1		BELLETTINI 65B	CNTR	Primakoff effect

¹LARIN 11 reported $\Gamma(\pi^0 \rightarrow \gamma\gamma) = 7.82 \pm 0.14 \pm 0.17$ eV which we converted to mean life $\tau = \hbar/\Gamma(\text{total})$.

²BYCHKOV 09 obtains this using the conserved-vector-current relation between the vector form factor F_V and the π^0 lifetime.

³WILLIAMS 88 gives $\Gamma(\gamma\gamma) = 7.7 \pm 0.5 \pm 0.5$ eV. We give here $\tau = \hbar/\Gamma(\text{total})$.

⁴BROWMAN 74 gives a π^0 width $\Gamma = 8.02 \pm 0.42$ eV. The mean life is \hbar/Γ .

NODE=S009M

NODE=S009M

NODE=S009M

NODE=S009D

NODE=S009D

NODE=S009D

NODE=S009T

NODE=S009T

NODE=S009T

NODE=S009T;LINKAGE=LA

NODE=S009T;LINKAGE=BY

NODE=S009T;LINKAGE=A1

NODE=S009T;LINKAGE=B

π^0 DECAY MODES

For decay limits to particles which are not established, see the appropriate Search sections (A^0 (axion) and Other Light Boson (X^0) Searches, etc.).

Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	2γ	$(98.823 \pm 0.034) \%$	S=1.5
Γ_2	$e^+ e^- \gamma$	$(1.174 \pm 0.035) \%$	S=1.5
Γ_3	γ positronium	$(1.82 \pm 0.29) \times 10^{-9}$	DESIG=20
Γ_4	$e^+ e^+ e^- e^-$	$(3.34 \pm 0.16) \times 10^{-5}$	DESIG=3
Γ_5	$e^+ e^-$	$(6.46 \pm 0.33) \times 10^{-8}$	DESIG=6
Γ_6	4γ	$< 2 \times 10^{-8}$	DESIG=5
Γ_7	$\nu \bar{\nu}$	[a] $< 2.7 \times 10^{-7}$	DESIG=7
Γ_8	$\nu_e \bar{\nu}_e$	$< 1.7 \times 10^{-6}$	DESIG=11
Γ_9	$\nu_\mu \bar{\nu}_\mu$	$< 1.6 \times 10^{-6}$	DESIG=12
Γ_{10}	$\nu_\tau \bar{\nu}_\tau$	$< 2.1 \times 10^{-6}$	DESIG=13
Γ_{11}	$\gamma \nu \bar{\nu}$	$< 6 \times 10^{-4}$	DESIG=15

Charge conjugation (C) or Lepton Family number (LF) violating modes

Γ_{12}	3γ	C	$< 3.1 \times 10^{-8}$	CL=90%
Γ_{13}	$\mu^+ e^-$	LF	$< 3.8 \times 10^{-10}$	CL=90%
Γ_{14}	$\mu^- e^+$	LF	$< 3.4 \times 10^{-9}$	CL=90%
Γ_{15}	$\mu^+ e^- + \mu^- e^+$	LF	$< 3.6 \times 10^{-10}$	CL=90%

[a] Astrophysical and cosmological arguments give limits of order 10^{-13} ; see the Particle Listings below.

NODE=S009215;NODE=S009

NODE=S009

NODE=S009;CLUMP=A

DESIG=4

DESIG=14

DESIG=22

DESIG=8

LINKAGE=S9

CONSTRAINED FIT INFORMATION

An overall fit to 2 branching ratios uses 6 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 4.6$ for 4 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

$$\begin{array}{c|cc} & -100 & \\ \hline x_2 & 0 & -1 \\ x_4 & & \\ \hline & x_1 & x_2 \end{array}$$

π^0 BRANCHING RATIOS

$\Gamma(e^+ e^- \gamma) / \Gamma(2\gamma)$		Γ_2 / Γ_1		
VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
1.188 \pm 0.035 OUR FIT	Error includes scale factor of 1.5.			
1.188 \pm 0.034 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.			
1.140 \pm 0.024 \pm 0.033	12.5k	⁵ BEDDALL	08 ALEP	$e^+ e^- \rightarrow Z \rightarrow$ hadrons
1.25 \pm 0.04		SCHARDT	81 SPEC	$\pi^- p \rightarrow n \pi^0$
1.166 \pm 0.047	3071	⁶ SAMIOS	61 HBC	$\pi^- p \rightarrow n \pi^0$
1.17 \pm 0.15	27	BUDAGOV	60 HBC	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.196		JOSEPH	60 THEO	QED calculation

NODE=S009220

NODE=S009R1

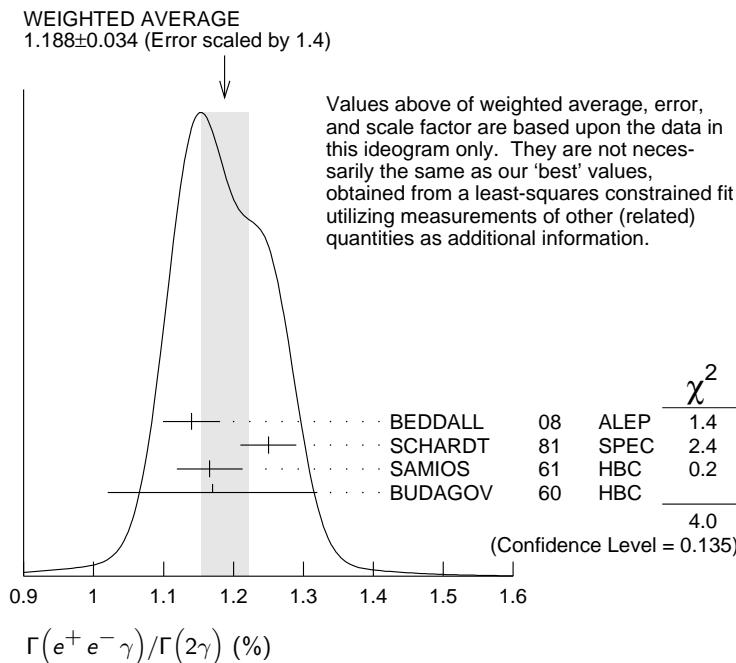
NODE=S009R1

⁵ This BEDDALL 08 value is obtained from ALEPH archived data.

⁶ SAMIOS 61 value uses a Panofsky ratio = 1.62.

NODE=S009R1;LINKAGE=BE

NODE=S009R1;LINKAGE=S



$\Gamma(\gamma\text{positronium})/\Gamma(2\gamma)$

VALUE (units 10^{-9})	EVTS	DOCUMENT ID	TECN	COMMENT
1.84±0.29	277	AFANASYEV 90	CNTR	pC 70 GeV

Γ_3/Γ_1

NODE=S009R12
NODE=S009R12

$\Gamma(e^+ e^+ e^- e^-)/\Gamma(2\gamma)$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.38±0.16 OUR FIT				
3.38±0.16 OUR AVERAGE				

Γ_4/Γ_1

NODE=S009R3
NODE=S009R3

7 This ABOUZAID 08D value includes all radiative final states. The error includes both statistical and systematic errors. The correlation between the Dalitz-pair planes gives a direct measurement of the π^0 parity. The $\pi^0 2\gamma^*$ form factor is measured and limits are placed on a scalar contribution to the decay.
8 SAMIOS 62B value uses a Panofsky ratio = 1.62.

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$

Γ_5/Γ

Experimental results are listed; branching ratios corrected for radiative effects are given in the footnotes. BERMAN 60 found $B(\pi^0 \rightarrow e^+ e^-) \geq 4.69 \times 10^{-8}$ via an exact QED calculation.

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
6.46±0.33 OUR AVERAGE					
6.44±0.25±0.22	794	9 ABOUZAID 07	KTEV		$K_L^0 \rightarrow 3\pi^0$ in flight
6.9 ± 2.3 ± 0.6	21	10 DESHPANDE 93	SPEC		$K^+ \rightarrow \pi^+ \pi^0$
7.6 $^{+2.9}_{-2.8}$ ± 0.5	8	11 MCFARLAND 93	SPEC		$K_L^0 \rightarrow 3\pi^0$ in flight

• • • We do not use the following data for averages, fits, limits, etc. • • •

6.09±0.40±0.24 275 12 ALAVI-HARATI99C SPEC 0 Repl. by ABOUZAID 07

9 ABOUZAID 07 result is for $m_{e^+ e^-}/m_{\pi^0} > 0.95$. With radiative corrections the result becomes $(7.48 \pm 0.29 \pm 0.25) \times 10^{-8}$.

10 The DESHPANDE 93 result with bremsstrahlung radiative corrections is $(8.0 \pm 2.6 \pm 0.6) \times 10^{-8}$.

11 The MCFARLAND 93 result is for $B[\pi^0 \rightarrow e^+ e^-] (m_{e^+ e^-}/m_{\pi^0})^2 > 0.95$. With radiative corrections it becomes $(8.8 $^{+4.5}_{-3.2}$ ± 0.6) \times 10^{-8}$.

12 ALAVI-HARATI 99C quote result for $B[\pi^0 \rightarrow e^+ e^-] (m_{e^+ e^-}/m_{\pi^0})^2 > 0.95$ to minimize radiative contributions from $\pi^0 \rightarrow e^+ e^- \gamma$. After radiative corrections they obtain $(7.04 \pm 0.46 \pm 0.28) \times 10^{-8}$.

NODE=S009R3;LINKAGE=AB

NODE=S009R3;LINKAGE=N

NODE=S009R13

NODE=S009R13

NODE=S009R13

NODE=S009R13;LINKAGE=AB

NODE=S009R13;LINKAGE=A

NODE=S009R13;LINKAGE=B

NODE=S009R13;LINKAGE=AH

$\Gamma(e^+e^-)/\Gamma(2\gamma)$

<u>VALUE</u> (units 10^{-7})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.3	90		NIEBUHR	89	SPEC $\pi^- p \rightarrow \pi^0 n$ at rest
<5.3	90		ZEPHAT	87	SPEC $\pi^- p \rightarrow \pi^0 n$ 0.3 GeV/c
1.7 \pm 0.6 \pm 0.3	59		FRANK	83	SPEC $\pi^- p \rightarrow n\pi^0$
1.8 \pm 0.6	58		MISCHKE	82	SPEC See FRANK 83
2.23 $^{+2.40}_{-1.10}$	90	8	FISCHER	78B	SPRK $K^+ \rightarrow \pi^+\pi^0$

 Γ_5/Γ_1 NODE=S009R5
NODE=S009R5 $\Gamma(4\gamma)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-8})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 2	90		MCDONOUGH 88	CBOX	$\pi^- p$ at rest
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<160	90		BOLOTOV	86C	CALO
<440	90	0	AUERBACH	80	CNTR

 Γ_6/Γ NODE=S009R4
NODE=S009R4 $\Gamma(\nu\bar{\nu})/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 0.27	90		13 ARTAMONOV 05A	B949	$K^+ \rightarrow \pi^+\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.83	90		13 ATIYA	91	B787 $K^+ \rightarrow \pi^+\nu\nu'$
< 2.9×10^{-7}			14 LAM	91	Cosmological limit
< 3.2×10^{-7}			15 NATALE	91	SN 1987A
< 6.5	90		DORENBOS...	88	CHRM Beam dump, prompt ν
<24	90	0	13 HERCZEG	81	RVUE $K^+ \rightarrow \pi^+\nu\nu'$

 Γ_7/Γ

NODE=S009R6

NODE=S009R6

NODE=S009R6

- 13 This limit applies to all possible $\nu\nu'$ states as well as to other massless, weakly interacting states.
 14 LAM 91 considers the production of right-handed neutrinos produced from the cosmic thermal background at the temperature of about the pion mass through the reaction $\gamma\gamma \rightarrow \pi^0 \rightarrow \nu\bar{\nu}$.
 15 NATALE 91 considers the excess energy-loss rate from SN 1987A if the process $\gamma\gamma \rightarrow \pi^0 \rightarrow \nu\bar{\nu}$ occurs, permitted if the neutrinos have a right-handed component. As pointed out in LAM 91 (and confirmed by Natale), there is a factor 4 error in the NATALE 91 published result (0.8×10^{-7}).

NODE=S009R6;LINKAGE=A

NODE=S009R6;LINKAGE=C

NODE=S009R6;LINKAGE=B

 $\Gamma(\nu_e\bar{\nu}_e)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.7	90		DORENBOS...	88	CHRM Beam dump, prompt ν
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90		16 HOFFMAN	88	RVUE Beam dump, prompt ν

 Γ_8/Γ

NODE=S009R8

NODE=S009R8

 $\Gamma(\nu_\mu\bar{\nu}_\mu)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.6	90	8.7	AUERBACH	04	LSND 800 MeV p on Cu
<3.1	90		17 HOFFMAN	88	RVUE Beam dump, prompt ν
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7.8	90		DORENBOS...	88	CHRM Beam dump, prompt ν

 Γ_9/Γ

NODE=S009R9

NODE=S009R9

NODE=S009R9;LINKAGE=A

 $\Gamma(\nu_\tau\bar{\nu}_\tau)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.1	90		18 HOFFMAN	88	RVUE Beam dump, prompt ν
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1	90		DORENBOS...	88	CHRM Beam dump, prompt ν

 Γ_{10}/Γ

NODE=S009R10

NODE=S009R10

NODE=S009R10;LINKAGE=A

$\Gamma(\gamma\nu\bar{\nu})/\Gamma_{\text{total}}$ Standard Model prediction is 6×10^{-18} .

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 6 \times 10^{-4}$	90	ATIYA	92	$K^+ \rightarrow \gamma\nu\bar{\nu}\pi^+$

 Γ_{11}/Γ

NODE=S009R15
NODE=S009R15
NODE=S009R15

 $\Gamma(3\gamma)/\Gamma_{\text{total}}$ Forbidden by C invariance.

VALUE (units 10^{-8})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 3.1	90		MCDONOUGH 88	CBOX	$\pi^- p$ at rest

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 38	90	0	HIGHLAND	80	CNTR
< 150	90	0	AUERBACH	78	CNTR
< 490	90	0	19 DUCLOS	65	CNTR
< 490	90	19	KUTIN	65	CNTR

19 These experiments give $B(3\gamma/2\gamma) < 5.0 \times 10^{-6}$.

 $\Gamma(\mu^+ e^-)/\Gamma_{\text{total}}$ Γ_{12}/Γ

NODE=S009R2
NODE=S009R2
NODE=S009R2

VALUE (units 10^{-9})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 0.38	90	0	APPEL	00	SPEC $K^+ \rightarrow \pi^+ \mu^+ e^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 16	90		LEE	90	SPEC $K^+ \rightarrow \pi^+ \mu^+ e^-$
< 78	90		CAMPAGNARI	88	SPEC See LEE 90

 $\Gamma(\mu^- e^+)/\Gamma_{\text{total}}$ Γ_{13}/Γ

NODE=S009R11
NODE=S009R11
NODE=S009R11

VALUE (units 10^{-9})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 3.4	90	0	APPEL	00B	B865 $K^+ \rightarrow \pi^+ e^+ \mu^-$

 $[\Gamma(\mu^+ e^-) + \Gamma(\mu^- e^+)/\Gamma_{\text{total}}$ Γ_{14}/Γ

NODE=S009R16
NODE=S009R16
NODE=S009R16

VALUE (units 10^{-9})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.36	90	ABOUZAID	08C	KTEV $K_L^0 \rightarrow 2\pi^0 \mu^\pm e^\mp$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 17.2	90	KROLAK	94	E799 $\ln K_L^0 \rightarrow 3\pi^0$
		HERCZEG	84	RVUE $K^+ \rightarrow \pi^+ \mu e$
$< 2 \times 10^{-6}$		HERCZEG	84	THEO $\mu^- \rightarrow e^-$ conversion
< 70	90	BRYMAN	82	RVUE $K^+ \rightarrow \pi^+ \mu e$

 π^0 ELECTROMAGNETIC FORM FACTOR

NODE=S009R7
NODE=S009R7
NODE=S009R7

The amplitude for the process $\pi^0 \rightarrow e^+ e^- \gamma$ contains a form factor $F(x)$ at the $\pi^0 \gamma\gamma$ vertex, where $x = [m_{e^+ e^-}/m_{\pi^0}]^2$. The parameter a in the linear expansion $F(x) = 1 + ax$ is listed below.

All the measurements except that of BEHREND 91 are in the time-like region of momentum transfer.

NODE=S009225

NODE=S009225

LINEAR COEFFICIENT OF π^0 ELECTROMAGNETIC FORM FACTOR

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.032 ± 0.004 OUR AVERAGE				
+0.026 ± 0.024 ± 0.048	7548	FARZANPAY	92	SPEC $\pi^- p \rightarrow \pi^0 n$ at rest
+0.025 ± 0.014 ± 0.026	54k	MEIJERDREES	92B	SPEC $\pi^- p \rightarrow \pi^0 n$ at rest
+0.0326 ± 0.0026 ± 0.0026	127	20 BEHREND	91	CELL $e^+ e^- \rightarrow e^+ e^- \pi^0$
-0.11 ± 0.03 ± 0.08	32k	FONVIEILLE	89	SPEC Radiation corr.

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.12	+0.05 -0.04		21 TUPPER	83	THEO FISCHER 78 data
+0.10	± 0.03	31k	22 FISCHER	78	SPEC Radiation corr.
+0.01	± 0.11	2200	DEVONS	69	OSPK No radiation corr.
-0.15	± 0.10	7676	KOBRAK	61	HBC No radiation corr.
-0.24	± 0.16	3071	SAMIOS	61	HBC No radiation corr.

NODE=S009A
NODE=S009A

- 20 BEHREND 91 estimates that their systematic error is of the same order of magnitude as their statistical error, and so we have included a systematic error of this magnitude. The value of a is obtained by extrapolation from the region of large space-like momentum transfer assuming vector dominance.
- 21 TUPPER 83 is a theoretical analysis of FISCHER 78 including 2-photon exchange in the corrections.
- 22 The FISCHER 78 error is statistical only. The result without radiation corrections is $+0.05 \pm 0.03$.

π^0 REFERENCES

We have omitted some papers that have been superseded by later experiments. The omitted papers may be found in our 1988 edition Physics Letters **B204** 1 (1988).

BERNSTEIN	11	arXiv:1112.4809	A.M. Bernstein, B.R. Hostein	(MIT, MASA)	REFID=54082
LARIN	11	PRL 106 162303	I. Larin <i>et al.</i>	(PrimEx Collab.)	REFID=16617
BYCHKOV	09	PRL 103 051802	M. Bychkov <i>et al.</i>	(PSI PIBETA Collab.)	REFID=52934
ABOUZAID	08C	PRL 100 131803	E. Abouzaid <i>et al.</i>	(FNAL KTeV Collab.)	REFID=52385
ABOUZAID	08D	PRL 100 182001	E. Abouzaid <i>et al.</i>	(FNAL KTeV Collab.)	REFID=52386
BEDDALL	08	EPJ C54 365	A. Beddall, A. Beddall	(UGAZ)	REFID=52486
ABOUZAID	07	PR D75 012004	E. Abouzaid <i>et al.</i>	(KTeV Collab.)	REFID=51593
ARTAMONOV	05A	PR D72 091102	A.V. Artamonov <i>et al.</i>	(BNL E949 Collab.)	REFID=50943
AUERBACH	04	PRL 92 091801	L.B. Auerbach <i>et al.</i>	(LSND Collab.)	REFID=49874
APPEL	00	PRL 85 2450	R. Appel <i>et al.</i>	(BNL 865 Collab.)	REFID=47754
Also		Thesis, Yale Univ.	D.R. Bergman		REFID=48055
Also		Thesis, Univ. Zurich	S. Pislik		REFID=48056
APPEL	00B	PRL 85 2877	R. Appel <i>et al.</i>	(BNL 865 Collab.)	REFID=47770
ALAVI-HARATI	99C	PRL 83 922	A. Alavi-Harati <i>et al.</i>	(FNAL KTeV Collab.)	REFID=47075
KROLAK	94	PL B320 407	P. Krolak <i>et al.</i>	(IFI, UCLA, COLO, ELMT+)	REFID=43710
DESHPANDE	93	PRL 71 27	A. Deshpande <i>et al.</i>	(BNL E851 Collab.)	REFID=43362
MCFARLAND	93	PR 71 31	K.S. McFarland <i>et al.</i>	(IFI, UCLA, COLO+)	REFID=43363
ATIYA	92	PRL 69 733	M.S. Atiya <i>et al.</i>	(BNL, LANL, PRIN+)	REFID=42140
FARZANPAY	92	PL B278 413	F. Farzanpay <i>et al.</i>	(ORST, TRIU, BRCO+)	REFID=41990
MEIJERDREES	92B	PR D45 1439	R. Meijer Drees <i>et al.</i>	(PSI SINDRUM-I Collab.)	REFID=42012
ATIYA	91	PRL 66 2189	M.S. Atiya <i>et al.</i>	(BNL, LANL, PRIN+)	REFID=41479
BEHREND	91	ZPHY C49 401	H.J. Behrend <i>et al.</i>	(CELLO Collab.)	REFID=41497
CRAWFORD	91	PR D43 46	J.F. Crawford <i>et al.</i>	(VILL, UVA)	REFID=41389
LAM	91	PR D44 3345	W.P. Lam, K.W. Ng	(AST)	REFID=41730
NATALE	91	PL B258 227	A.A. Natale	(SPIFT)	REFID=41484
AFANASYEV	90	PL B236 116	L.G. Afanasyev <i>et al.</i>	(JINR, MOSU, SERP)	REFID=41201
Also		SNJP 51 664	L.G. Afanasyev <i>et al.</i>	(JINR)	REFID=41298
		Translated from YAF 51 1040.			
LEE	90	PRL 64 165	A.M. Lee <i>et al.</i>	(BNL, FNAL, VILL, WASH+)	REFID=41094
FONVIEILLE	89	PL B233 65	H. Fonvieille <i>et al.</i>	(CLER, LYON, SACL)	REFID=41041
NIEBUHR	89	PR D40 2796	C. Niebuhr <i>et al.</i>	(SINDRUM Collab.)	REFID=40874
CAMPAGNARI	88	PRL 61 2062	C. Campagnari <i>et al.</i>	(BNL, FNAL, PSI+)	REFID=40620
CRAWFORD	88B	PL B213 391	J.F. Crawford <i>et al.</i>	(PSI, UVA)	REFID=40779
DORENBOS...	88	ZPHY C40 497	J. Dorenbosch <i>et al.</i>	(CHARM Collab.)	REFID=40701
HOFFMAN	88	PL B208 149	C.M. Hoffman	(LANL)	REFID=40646
MCDONOUGH	88	PR D38 2121	J.M. McDonough <i>et al.</i>	(TEMP, LANL, CHIC)	REFID=40685
PDG	88	PL B204 1	G.P. Yost <i>et al.</i>	(LBL+)	REFID=40022
WILLIAMS	88	PR D38 1365	D.A. Williams <i>et al.</i>	(Crystal Ball Collab.)	REFID=40567
ZEPHAT	87	JPG 13 1375	A.G. Zephath <i>et al.</i>	(OMICRON Collab.)	REFID=40875
BOLOTOV	86C	JETPL 43 520	V.N. Bolotov <i>et al.</i>	(INRIM)	REFID=40310
		Translated from ZETFP 43 405.			
CRAWFORD	86	PRL 56 1043	J.F. Crawford <i>et al.</i>	(SIN, UVA)	REFID=10744
ATHERTON	85	PL 158B 81	H.W. Atherton <i>et al.</i>	(CERN, ISU, LUND+)	REFID=10743
HERCZEG	84	PR D29 1954	P. Herczeg, C.M. Hoffman	(LANL)	REFID=10742
FRANK	83	PR D28 423	J.S. Frank <i>et al.</i>	(LANL, ARZS)	REFID=10740
TUPPER	83	PR D28 2905	G.B. Tupper, T.R. Grose, M.A. Samuel	(OKSU)	REFID=10741
BRYMAN	82	PR D26 2538	D.A. Bryman	(TRIU)	REFID=10738
MISCHKE	82	PRL 48 1153	R.E. Mischke <i>et al.</i>	(LANL, ARZS)	REFID=10739
HERCZEG	81	PL 100B 347	P. Herczeg, C.M. Hoffman	(LANL)	REFID=10736
SCHARDT	81	PR D23 639	M.A. Schardt <i>et al.</i>	(ARZS, LANL)	REFID=10737
AUERBACH	80	PL 90B 317	L.B. Auerbach <i>et al.</i>	(TEMP, LASL)	REFID=10734
HIGHLAND	80	PRL 44 628	V.L. Highland <i>et al.</i>	(TEMP, LASL)	REFID=10735
AUERBACH	78	PRL 41 275	L.B. Auerbach <i>et al.</i>	(TEMP, LASL)	REFID=10730
FISCHER	78	PL 73B 359	J. Fischer <i>et al.</i>	(GEVA, SACL)	REFID=10732
FISCHER	78B	PL 73B 364	J. Fischer <i>et al.</i>	(GEVA, SACL)	REFID=10733
BROWMAN	74	PRL 33 1400	A. Browman <i>et al.</i>	(CORN, BING)	REFID=10727
BELLETTINI	70	NC 66A 243	G. Bellettini <i>et al.</i>	(PISA, BONN)	REFID=10723
KRYSHKIN	70	JETPL 30 1037	V.I. Kryshkin, A.G. Sterligov, Y.P. Usov	(TMSK)	REFID=10724
		Translated from ZETFP 57 1917.			
DEVONS	69	PR 184 1356	S. Devons <i>et al.</i>	(COLU, ROMA)	REFID=10722
VASILEVSKY	66	PL 23 281	I.M. Vasilevsky <i>et al.</i>	(JINR)	REFID=10721
BELLETTINI	65B	NC 40A 1139	G. Bellettini <i>et al.</i>	(PISA, FIRZ)	REFID=10716
DUCLOS	65	PL 19 253	J. Duclos <i>et al.</i>	(CERN, HEID)	REFID=10717
KUTIN	65	JETPL 2 243	V.M. Kutjin, V.I. Petrukhin, Y.D. Prokoshkin	(JINR)	REFID=10719
		Translated from ZETFP 2 387.			
CZIRR	63	PR 130 341	J.B. Czirr	(LRL)	REFID=10692
SAMIOS	62B	PR 126 1844	N.P. Samios <i>et al.</i>	(COLU, BNL)	REFID=10708
KOBRAK	61	NC 20 1115	H. Kobrak	(IFI)	REFID=10706
SAMIOS	61	PR 121 275	N.P. Samios	(COLU, BNL)	REFID=10707
BERMAN	60	NC XVIII 1192	S. Berman, D. Geffen		REFID=47500
BUDAGOV	60	JETP 11 755	Y.A. Budagov <i>et al.</i>	(JINR)	REFID=10702
		Translated from ZETFP 38 1047.			
JOSEPH	60	NC 16 997	D.W. Joseph	(IFI)	REFID=10703

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